Motivation

Modern digitalisation and automation applications in agriculture and other industries need continuous, cm-accurate GNSS position information in real time. The required GNSS correction data is typically transmitted to the users via mobile Internet.

Due to dead spots in the cellular network coverage, nationwide correction reception cannot be guaranteed. To overcome coverage gaps, commercial providers broadcast the GNSS corrections additionally via geostationary satellites in proprietary formats.

In the SSR*over*DAB+ project, the project partners are working on solutions for distributing precise GNSS corrections in an open data format via digital radio in Germany. The excellent DAB+ coverage could mitigate the effect of cellular reception problems in rural regions.

The developments in SSR*over*DAB+ cover the definition and implementation of an open PPP-RTK correction data format, the data transmission via DAB+ and the real-time GNSS data processing in the mobile positioning system using PPP-RTK correction data.

Due to the absence of a commercial GNSS rover on the market for processing these corrections, the Alberding A10-RTK sensor is used as an evaluation platform to demonstrate the efficiency of the PPP-RTK processing approach and the DAB+ distribution.

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SSR*over*DAB+

Precise GNSS correction data via DAB+ digital radio

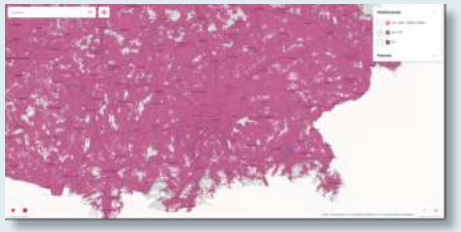
Funded under the 2nd element of the "Navigation Innovation and Support Programme" of the European Space Agency ESA (ESA NAVISP Element 2)

Reliable data link for precise GNSS correction transmission

Until GNSS satellites alone provide cm-accurate positions, terrestrial augmentation systems are needed to generate corrections for the satellite signals. Most GNSS positioning applications require these corrections in real time.

A reliable and cost-effective data link for GNSS correction transmission is a key element for precise positioning applications. Since the introduction of the Ntrip protocol, mobile Internet has become the major correction distribution channel.

Due to gaps in mobile Internet coverage, continuous reception of GNSS corrections is not guaranteed. The additional transmission via the existing DAB+ radio broadcasting infrastructure could reduce reception problems in the field.



t-map.telekom.de/tmap2/coverage_checker/

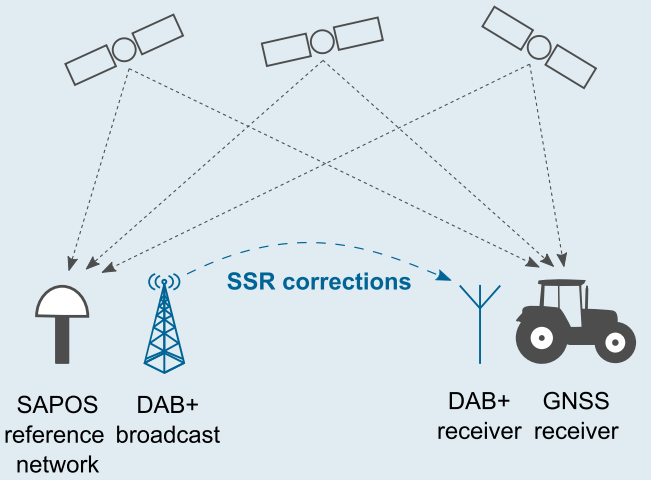
www.dabplus.de/empfang/

The maps above show the LTE and DAB+ coverages in southern Bavaria (20.09.2022).

The SSR*over*DAB+ approach

In the SSR*over*DAB+ project, system solutions are developed to transmit a PPP-RTK correction stream in Germany.

The correction data is generated from the SAPOS GNSS reference station network, and broadcast via the existing DAB+ transmission infrastructure using the open SSRZ data format.



To access the corrections, a DAB+ receiver module with the necessary demodulator software is integrated in the Alberding A10-RTK GNSS rover receiver.

Multiple processing algorithms are developed for precise positioning of mobile systems using the open PPP-RTK messages received via DAB+. For system evaluation and tests in agricultural field trials the algorithms will be integrated into the A10-RTK sensor platform.

SSR*over*DAB+ user applications

User benefits

- High correction availability with DAB+
- High accuracy (cm) and rapid convergence
- No GNSS hardware dependencies (open format)
- No running data reception costs
- Unlimited number of users
- Ideal for mass-market applications
- Alberding A10-RTK for field testing